Remarks

In view of the above amendments to the claims and the following discussion, the applicants submit that none of the claims now pending in the application are obvious under the provisions of 35 U. S. C. § 103. Thus, the applicants believe that all of these claims are in allowable form.

REJECTIONS

A. 35 U. S. C. § 103

1. Claims 1-13 are not unpatentable over Bu

Claims 1-13 stand rejected under 35 U.S.C. § 103(a) as being obvious over Bu (U.S. Patent Publication 2002/0101172 published August 1, 2002). The applicants submit that these claims are not rendered obvious over this reference.

In amended claim 1, the expression "current supply means capable of" has been replaced by the expression "one single DC voltage generator for", as disclosed in our corresponding publication US 2008/0272993A1 in paragraph 0053.

As described in paragraph 0053, the power supply means V_{dd} for the emitters 2 comprise one DC voltage generator per column of emitters 2 supplies a line 4 to which all of the emitters of this column are connected. The line 4 is therefore a same and single supply line supplying all of the emitters of a column, as described in amended claim 1, which is supplied during both emission steps and programming steps of the emitters of said column. See also paragraph 0059: as soon as a modulator 14 of the column is turned on, by applying an address and select voltage, the corresponding emitter is supplied by just the generator V_{dd}.

The image display device of the present invention includes a programming step, step C, during which a drive current I_{data} is applied to the gate

of modulator 14 and capacitor 18, so that capacitor 18 is charged and a drain current I_d is flowing through modulator 14 and correspondingly through emitter 2. The emitter 2 is therefore supplied with power by generator V_{dd} already during the programming step C, paragraph 0094. These steps are also clearly shown in FIGS. 3A-3D.

The drain current I_d flowing through emitter 2 is measured at the same time by a single separate unit 26, which comprises for example a resistor and a precision operational amplifier, as described with regard to FIG. 2 of the present application, paragraph 0081, for providing a value representative of the drain current I_d, as supplied to the selected emitter 2. A comparator compares this representative value of the drain current I_d with the value representative of the data set point, voltage V_c, for controlling the quantity of charge stored in the storage capacitor 18. As can be seen with regard to FIG. 3D, the drain current I_d is rising until a current value is reached corresponding with drive current I_{data}, in which case comparator 28 provides a warning signal S to control unit 34, which in turn closes switch 32 to interrupt the drive current I_{data}, as shown in FIG. 3D. The programming step C is then completed, paragraph 0096.

In the next step D, the select voltage V_{select} is switched off, FIG. 3A, because in capacitor 18 now the correct drive I_{data} for modulator 14 is stored, to continue to provide the correct drain current I_d to emitter 2, which continues therefore with light emission during an emission phase following the programming phase over the duration of an image frame, until in a further step a new step A is provided for resetting the address circuit 6 with capacitor 18, for providing a further programming step for a corresponding new frame, paragraph 0101.

The emitter 2 continues therefore illuminating with the correct drain current I_{data}, until a new reset step A is applied, as shown in FIG. 3D. The correct drain current I_d is provided independently of the individual trip voltage of selected emitter 2, because the drain current I_d flowing through emitter 2 is measured during light emission by means of measuring unit 26 and comparator 28, and

when the correct drive current I_{data} is applied to capacitor 18, corresponding with control voltage Uc, the respective drain current I_d is maintained. Therefore a very efficient trip-threshold compensation means is provided, including e.g. a measuring circuit 26 with a comparator 28 and only a simple resistor 45 in the supply line 4 of voltage generator Vdd, which measuring circuit 26 is operative for all of the emitters of a column of the image display device, as described with regard to FIG. 1, paragraph 0068.

The cited reference Bu, US 6,433,488 B1, describes an image display device comprising a circuit block 5 with two transistors 53, 54 arranged in the supply line between an emitter 1 and a supply voltage generator providing a supply voltage Vs. Transistor 54 is arranged in the supply line for interrupting the voltage supply to the emitter 1, and transistor 53 is arranged for applying at the same time a driving current I_{OLED} to emitter 1. The circuit block 5 includes further an inverter ahead of transistor 54, so that, when a scan signal is applied to circuit block 5, transistor 53 is switched through and transistor 54 is blocked, to apply only driving current I_{OLED} to emitter 1 during a programming step.

A current comparator 6 compares driving current I_{OLED} with a reference current I_{REF} in the programming mode and provides a feedback voltage V_{FB} for a data signal at input 4, to compensate the trip-threshold voltage of modulator 21. When the driving current I_{OLED} is smaller than reference current $I_{REF,}$ a positive feedback voltage V_{FB} is output so that the voltage at the gate electrode 213 of modulator 21 increases. Correspondingly, when the driving current I_{OLED} is larger than reference current $I_{REF,}$ the voltage at the gate electrode 213 is decreased, column 3, line 64 to column 4, line 11. When the programming step is finished, the scan signal 3 is turned to low, so that driving current I_{OLED} is switched off via transistor 53 and transistor 54 is switched on for supplying emitter 1 with supply voltage Vs for light emission, during an emission step, column 1, lines 62-64 and column 4, lines 12-25.

The reference Bu discloses therefore a programming step, during which a specific drive current I_{OLED} is applied to emitter 1, for providing a correct

programming voltage for modulator 21, and an emission step, during which supply voltage Vs is provided to emitter 1, for providing a correct light emission of emitter 1. As described with regard to fig. 2, a circuit block 5 is required for each emitter 1, to provide the correct programming voltage for the respective modulator 21, because when circuit block 5 would be used for a subsequent emitter of a row, the supply voltage Vs to the previous emitter would be interrupted by transistor 54.

The image display device as described by Bu is therefore completely different with regard to the image display device as described by amended claim 1:

> "With the present invention, the emitter is turned on during the programming step and continues to illuminate, supplied with current by one single DC voltage generator during programming step and emission step, until a reset signal is provided for generating a new image frame.
> Bu discloses an image display device comprising a programming step, in which current I_{OLED} is provided for emitter 1 for comparing the current I_{OLED} with reference current I_{ref}, and an emission phase, during which supply voltage Vs is connected to emitter 1 for providing light emission of emitter 1."

The present invention has the advantage, that the only one voltage source V_{dd} is used for providing supply current for obtaining the correct programming voltage for modulator 14 during the programming phase as well as for providing supply current during the emission phase. No switching off of the supply current I_d is necessary after the programming phase, and therefore no additional switches have to be provided, which is the case for the image display device of Bu.

Because the reference Bu provides for each emitter 1 a respective drive current I_{OLED} for comparison with a reference current $I_{REF,}$ each individual emitter 1 of Bu requires respective switches 53, 54, also an inverter INV, so that a high number of components is necessary, corresponding to the number of emitters 1 for the image display device of Bu. The voltage generator V_{dd} of the present

invention provides the drain current I_d to all emitters of a row via a single line 4, so that only a one unit 12 is necessary for a complete column of emitters 2. The number of circuit components is therefore essentially reduced with regard to the image display device of Bu. Amended claim 1 is therefore patentable over Bu.

In view of the above arguments, Applicants respectfully submit that claims 2-13 are also patentable based on their dependence upon claim 1.

CONCLUSION

Thus, the applicants submit that none of the claims, presently in the application, are obvious under the provisions of 35 U. S. C. § 103. Consequently, the applicants believe that all of the claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues for any of the claims now pending in the application, it is requested that the Examiner telephone Ms. Patricia A. Verlangieri, at (609) 734-6867, so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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